Chemistry 236 -- Quiz 9

November 19, 2003 — Physical Adsorption of Gases

Pledge and signature:

Note: If you want your paper returned folded (*i.e.*, score concealed), please print your name on the back.

In a typical adsorption experiment, the sample cell is found to have a volume of **17.3 cm^3** and the vacuum manifold (including Baratron gauge) **72.7 cm^3**. The manifold is charged with N_2 to a pressure of **84.1 Torr**. Then the valve to the cell (under vacuum) is opened, with the cell containing **1.0 cm^3** of silica gel and the whole system at T = **295 K**. After the new P is measured (P_2), the cell is cooled with LN2, dropping the P to **8.5 Torr** (P_3). The "cold volume" may be taken to be **6.6 cm^3**. [R = 0.082058 L atm mol^{-1} K^{-1}; 1 mol = 22 414 STP cc; LN2 T = 77 K.]

1. (3) Calculate P_2 (in Torr).

2. (3) Calculate the amount of N_2 initially placed in the manifold, in STP cc.

3. (6) Calculate the amounts of N_2 adsorbed and remaining in the gas phase at the end.